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STATE DOCUMENTS

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ENGINEERING REPORT  
FOR  
COMPARISON OF COSTS  
OF  
ALTERNATE LINES  
OF  
INTERSTATE ROUTE 1-90  
  
IN THE VICINITY  
OF  
  
BILLINGS

PREPARED BY  
MONTANA STATE HIGHWAY COMMISSION  
INTERSTATE DIVISION  
MARCH 20, 1961

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## FOREWARD

This report is developed to show the relationship of the principal features for two locations of Interstate Highway 90 in the vicinity of Billings, Montana, between the east terminus of the Mossmain-Billings project, which is currently under construction, and the intersection of the proposed location at Sugar Avenue.

The two alternate alignments considered are shown on the aerial photographs included in this report.

The North Line is the alignment proposed prior to the consideration of a railroad relocation. Reference is made to the "Report on Railroad Grade Crossing Elimination" by De Leuw, Cather and Company.

The South Line is an alternate location that has been developed to avoid conflict with the proposed Railroad relocation and in consideration of the following statement from the DeLeuw, Cather and Company report.

"East of Orchard Lane, if Interstate Highway 90 is constructed along the alignment currently planned, the railroad would be constructed on the present location of King Avenue. Right of way for relocated King Avenue would be purchased parallel to and north of its present location. Based on the present improvements in the area, this portion of the line would involve demolishing or moving some 36 residences, certain outbuildings and commercial structures, and a trailer court.

"If construction of the interstate route were deferred long enough for its alignment to be revised, the railroad relocation and the highway could both be shifted about 100 feet southerly, thereby allowing King Avenue to be retained as a frontage road and saving many of the aforementioned residences and other improvements.

"If the interstate route is constructed without such provisions, the cost of relocating the railroad would be greatly increased, if indeed the opportunity was not entirely lost."

## COST ESTIMATE

### Grading:

Grading quantities for the interchange ramps and for the Interstate lanes in the interchange area were computed by Road Plans Department from design plans. Quantities for the Interstate lanes outside the interchange area were computed by means of curves that relate earthwork volumes to the height of fill, depth of cut, and the percent of cross slope.

A base price of \$0.35 was used for the excavation and the borrow. To this was added \$0.10 for watering and rolling, and \$0.30 was added for overhaul, establishing a unit price of \$0.75 per cubic yard for earthwork.



### Base and Surfacing

The material quantities for base and surfacing courses were computed for the mainline and the ramp typical sections that are proposed. The unit cost is based on the 1959 average low bid price.

### Structures

The length and width of all structures were determined from preliminary profiles and the typical sections involved. The cost was estimated on the basis of the deck area and the unit prices established by the Bridge Department for use in the 104b Study.

### Right of Way

The Right of Way Division evaluated the right of way costs on the basis of field examinations.





NORTH LINE COST ESTIMATE

ITEM	UNIT	COST PER UNIT	QUANTITY	COST	SUBTOTAL	TOTAL
FREEWAY						
GRADING						
MAINLINE	c.y.	\$ 0.75	375,294	\$ 281,470	\$	
MAINLINE (IN INTERCHANGE AREA)	c.y.	0.75	234,568	175,926		
FRONTAGE ROAD	c.y.	0.75	78,698	59,024		
SUBTOTAL					516,420	
BASE						
MAINLINE	Sta.	670	217	145,390		
SHOULDER	Sta.	303	217	65,751		
FRONTAGE ROAD	Sta.	167	185	30,895		
SUBTOTAL					242,036	
SURFACING						
MAINLINE	Sta.	679	217	147,343		
SHOULDER	Sta.	395	217	85,715		
FRONTAGE ROAD	Sta.	291	185	53,835		
SUBTOTAL					286,893	
SEPARATIONS						
BILLINGS AVENUE OVER INTERSTATE	sq.ft.	10.20	13,799	140,750		
INTERSTATE OVER SUGAR AVENUE	sq.ft.	10.20	14,006	142,861		
SUBTOTAL					283,611	
RIGHT OF WAY					407,225	
FREEWAY TOTAL						1,736,185
INTERCHANGE						
GRADING RAMPS						
BASE AND SURFACING RAMPS	c.y.	0.75	308,450	231,338		
STRUCTURES	Sta.	393	163	64,059		
INTERSTATE OVER ADOBE ROAD	sq.ft.	11.38	14,945	170,074		
PRIMARY OVER INTERSTATE	sq.ft.	10.20	13,835	141,117		
ADOBE ROAD OVER PRIMARY	sq.ft.	10.20	16,183	165,067		
ADOBE ROAD OVER R.R. MAINLINE	sq.ft.	10.20	20,154	205,571		
ADOBE ROAD OVER FUTURE R.R. SPUR	sq.ft.	10.20	11,956	121,951		
ADOBE ROAD OVER FUTURE R.R. SPUR	sq.ft.	10.20	11,956	121,951		
SUBTOTAL					925,731	
RIGHT OF WAY					381,825	
INTERCHANGE						1,602,953
TOTAL ESTIMATE COST						3,339,138



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SOUTH LINE COST ESTIMATE

ITEM	UNIT	COST PER UNIT	QUANTITY	COST	SUBTOTAL	TOTAL
<b>FREEWAY</b>						
<b>GRADING</b>						
MAINLINE	c.y.	\$ 0.75	448,628	\$ 336,471	\$	\$
MAINLINE (IN INTERCHANGE AREA)	c.y.	0.75	480,284	360,213		
FRONTAGE ROAD	c.y.	0.75	84,150	63,112		
SUBTOTAL					759,796	
<b>BASE</b>						
MAINLINE	Sta.	670	231	154,770		
SHOULDER	Sta.	303	231	69,993		
FRONTAGE ROAD	Sta.	167	198	33,066		
SUBTOTAL					257,829	
<b>SURFACING</b>						
MAINLINE	Sta.	675	231	156,849		
SHOULDER	Sta.	395	231	91,245		
FRONTAGE ROAD	Sta.	291	198	57,618		
SUBTOTAL					305,712	
<b>SEPARATIONS</b>						
BILLINGS AVENUE OVER INTERSTATE	sq.ft.	10.20	9,221	94,054		
INTERSTATE OVER SUGAR AVENUE	sq.ft.	10.20	17,763	181,183		
SUBTOTAL					275,237	
<b>RIGHT OF WAY</b>					238,300	
<b>FREEWAY TOTAL</b>						1,837,374
<b>INTERCHANGE</b>						
<b>GRADING RAMPS</b>						
BASE AND SURFACING RAMPS	c.y.	0.75	398,620	298,965		
<b>STRUCTURES</b>	Sta.	393	106	41,658		
INTERSTATE OVER ADOBE ROAD	sq.ft.	11.38	16,226	184,652		
PRIMARY OVER INTERSTATE	sq.ft.	10.20	17,080	174,216		
ADOBE ROAD OVER PRIMARY	sq.ft.	10.20	15,372	156,794		
ADOBE ROAD OVER R.R. MAINLINE	sq.ft.	10.20	19,215	195,993		
SUBTOTAL					711,655	
<b>RIGHT OF WAY</b>					445,000	
<b>INTERCHANGE TOTAL</b>						1,497,278
<b>TOTAL ESTIMATE COST</b>						3,334,652



SUMMARY OF COSTS

<u>ITEM</u>	<u>NORTH LINE</u>	<u>SOUTH LINE</u>
FREEWAY		
GRADING	\$ 516,420	\$ 759,796
BASE	242,036	257,829
SURFACING	286,893	305,712
SEPARATIONS	283,611	275,237
RIGHT OF WAY	<u>407,225</u>	<u>238,800</u>
SUBTOTAL	1,736,185	1,837,374
INTERCHANGE		
GRADING	231,338	298,965
BASE & SURFACING	64,059	41,658
STRUCTURES	925,731	711,655
RIGHT OF WAY	<u>381,825</u>	<u>445,000</u>
SUBTOTAL	1,602,953	1,497,278
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TOTAL ESTIMATE COST	\$ 3,339,138	\$ 3,334,652



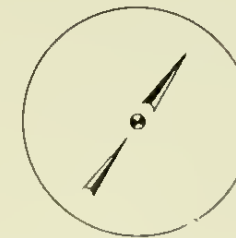
### CONCLUSION

The cost differential in favor of the South Line and the elimination of any conflict to the future railroad relocation proposition strongly supports the South Line for the location of this section of the Interstate System.





# NORTH ROUTE

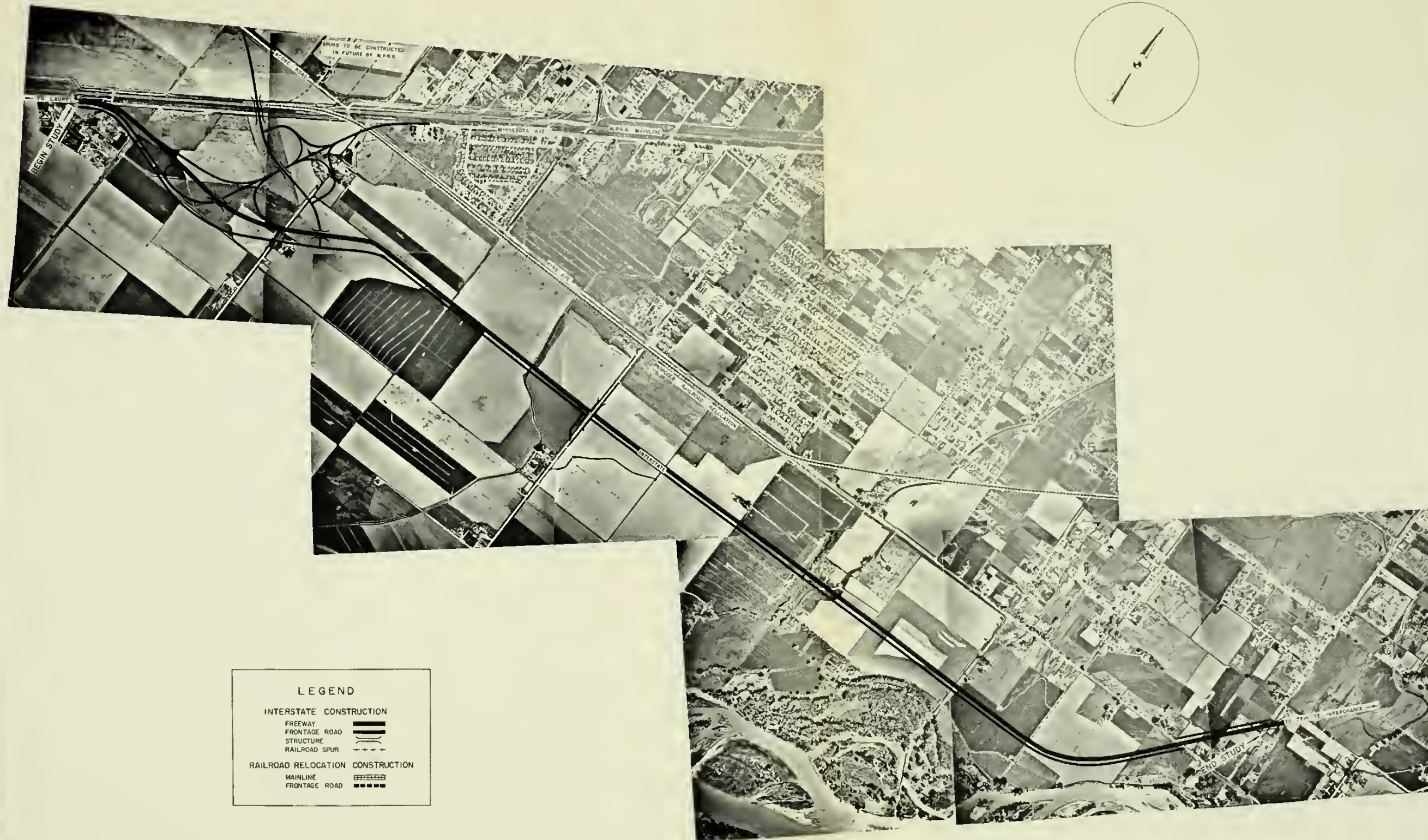
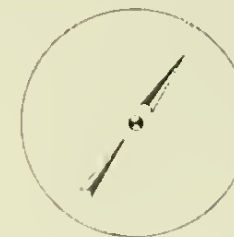


LEGEND	
INTERSTATE CONSTRUCTION	
FREEWAY	=====
FRONTAGE ROAD	=====
STRUCTURE	=====
RAILROAD SPUR	-----
RAILROAD RELOCATION CONSTRUCTION	
MAINLINE	=====
FRONTAGE ROAD	=====





# SOUTH ROUTE



LEGEND	
INTERSTATE CONSTRUCTION	
FREEWAY	
FRONTAGE ROAD	
STRUCTURE	
RAILROAD SPUR	
RAILROAD RELOCATION CONSTRUCTION	
MAINLINE	
FRONTAGE ROAD	

